

Description

[Method for Stripping Cured Paint from Low Temperature Plastic Substrates]

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] 5,468,779 ISSUED ON NOVEMBER 21, 1995, YAMAMOTO, ET AL., CLASS 521/46.5. 5,578,135 ISSUED ON NOVEMBER 26, 1996, LOHR, ET AL., CLASS 134/7. 6,608,012 ISSUED ON AUGUST 19, 2003, MACHAC, JR., ET AL., CLASS 510/212. 6,660,100 ISSUED ON DECEMBER 9, 2003, WIEDEMANN, CLASS 134/6.

BACKGROUND OF INVENTION

[0002] The Industrial, Automotive, Appliance, Agricultural and Aircraft Industries paint interior and exterior parts to protect the substrates from corrosion and to enhance the cosmetic appearance to help market the finished product. Most paint finishing manufactures and paint finishing job shops have a zero tolerance for paint defects in the final product. The first pass paint finish many times will not pass the quality inspection. Up to 30% of first pass paint

finishes are rejected by the quality inspectors and sent back to be stripped and reprocessed through paint. Reject painted plastic parts are usually sold at a negative value for scrap at salvage costs or crushed into particles to recycle. The present methods for paint removal on rework painted plastic parts has been taught by the following inventors: Yamamoto, et al., in 1995, patent number 5,468,779 taught a method of paint removal from plastic by first course-crushing the plastic molded parts and utilizing a composition that consists; a heterocyclic compound, a triazine compound and a phenylendiamine compound. In 1996, Lohr, et al., taught in patent number 5,578,135 to first mechanically comminute the plastic molded parts into particles of a pour-able size then circulate in a mixture of anhydrous alkified diethylene glycol or propylene glycol at temperatures of 50 degrees C. to 75 degrees C. In August of 2003, Machac, Jr., et al., in patent number 6,608,012, teaches methods to remove paint from thermoplastic polyolefin, requiring temperatures of 45 degrees C. to 75 degrees C. with a composition consisting a mixture of a carbonate, a pyrrolidone, a monoester, a ketone, a glycol ether and an organic sulfur containing compound. In December of 2003, Wiedemann,

in patent number 6,660,100, taught first crush the plastic parts in to small pieces prior to paint removal, then immerse the plastic pieces into an emulsion consisting an aqueous mixture of caustic lye and solvent. This invention provides a novel process that may be placed in the paint finishing plant or job shop to strip the cured paint from the molded plastic part in-tact, without grinding the part for waste or partial recycle. The rework plastic painted part can be completely stripped in an as-is condition, at ambient temperatures in 15 minutes to 30 minutes, the rework parts can then be sent back through the paint line for reprocess through paint in a like new condition. Prior art utilized many different compositions and methods to strip the cured paint. Prior art methods to strip cured paint include the following: High pH Caustic Hydroxides, low pH acid solutions that will attack soft base metal substrates such as aluminum, galvanized, brass, zinc and magnesium substrates. High temperature bake ovens operate in the 600F to 1200F range which would melt plastic and most aluminum parts and often create metal fatigue on steel or adversely affect the life of the part. Abrasives are also used to strip cured paint, many times adversely affecting the substrates surface. Abrasives can not remove

cured paint from the parts hidden interior or recessed areas.

SUMMARY OF INVENTION

[0003] The inventor discovered improved methods to chemically strip low temperature plastics, wood, steel, aluminum, brass, magnesium, galvanized steel, zinc and non-ferrous substrates at ambient temperatures with the part in-tact. This novel mixture effectively removes paint by dissolving and undercutting the cured paint film, normally in 15 to 30 minutes. The composition will strip most current paint technologies including, not limited to the following: Electro-Deposition (E-Coat), Powder Coat Technologies, Solvent Borne, Water Borne and Clear Coat Technologies, Lacquer Technologies, Latex Technologies, Epoxy Coating Technologies and Urethane Coating Technologies. This invention is an ambient temperature method to strip cured paint from plastics with low temperature thresholds, in addition to wood, steel, aluminum, brass, magnesium and non-ferrous substrates. A paint stripping composition based on a unique mixture of a boric acid ester, at least one alcohol, at least one surfactant and at least one evaporation inhibitor, at least one alkaline or acid activator and at least one additive and may contain at least

one co-solvent and may be utilized as-is, with a water thin viscosity, in an immersion tank or thickened and applied by spray, brush or roller. More specifically, a paint stripping process invented to salvage, recover and recycle reject or sometimes called rework painted production parts, in-tact, without first crushing the plastic part.

DETAILED DESCRIPTION

[0004] This invention is an ambient temperature method to strip cured paint from plastics with low temperature thresholds; in addition, this novel method can be utilized to strip wood, steel, aluminum, brass, magnesium and non-ferrous substrates. A paint stripping composition based on a unique mixture of Boron methoxide and additives comprising: at least one alcohol, at least one surfactant and at least one evaporation inhibitor, at least one alkaline or acid activator and may contain at least one co-solvent and may be utilized as-is, water thin, in an immersion tank or thickened and applied by spray, brush or roller. More specifically, a paint stripping process invented to salvage, recover and recycle reject or sometimes called rework painted production parts, in-tact, without adversely affecting the parts substrate and form.

[0005] The composition of this invention consists a Boron

methoxide mixture comprising:

- [0006] a) at least one additive selected from the group of additives consisting; water, organic solvents, alcohols, aliphatic solvents, polar solvents, non-polar solvents, naphtha, oxygenated solvents, chlorinated solvents, acetones, ketones, acetates, terpene solvents, esters, acetylene solvents, glycols, ethers, propionate solvents, carbonates, aromatic solvents, kerosene, fatty acid based solvents, vegetable based solvents, acids, inorganic acids, organic acids, fatty acids, lactic acids, glycolic acids, alkaline hydroxides, alkaline silicates, phosphates, oxides, sulfates, nitrates, alkaline salts, acid salts, amines, peroxides, oxidizers, rust inhibitors, chelators, defoamers, thickeners, fragrances, coloring agents, evaporation inhibitors, waxes, oils, surfactants and mixtures thereof;
- [0007] b) immersing said cured painted substrate in said strip tank containing said stripping composition; or
- [0008] c) applying said stripping composition to said cured painted substrate in a thickened form at ambient temperature for approximately 15 minutes to 30 minutes, wherein cured paint is removed from said substrate. This invention was tested for paint removal with present Industrial, Automotive, Wheel, Appliance, Agricultural and

Aircraft Industry Paint Technologies. Paint tested was from the following manufactures: Dupont, PPG, Akzo Nobel, BASF, Red Dot, Morton, and Ferro. Paints tested were Powder, E-Coat, Automotive-(E-Coat, Base Coat/Clear Coat), Urethane, Lacquer Results were observed at 15 minutes, 20 minutes and 30 minutes at ambient temperatures. T

[0009] The time to completely strip parts for reprocess is provided:

[0010] *Boron methoxide mixture, parts immersed at ambient temperature.*

Paint Technologies	% Stripped 15 minutes	% Stripped 20 minutes	% Stripped 30 minutes
E-Coat (over steel)	30%	50%	100%
Powder Coat (aluminum wheel)	25%	45%	100%
Enamel (electro-galvanized)	35%	55%	100%
Lacquer (oak wood furniture)	40%	60%	100%
Clear Coat (brass handle)	30%	50%	100%
Urethane (Plastic Mirror Housing)	90%	100%	100%
Base Coat (magnesium)	35%	55%	100%

Note: all painted parts had a cured paint film build of 1 to 2 mil. Paint strip results were similar regardless of application methods.